

**ABSTRACT**

A system and method for narrowing the range of frequency uncertainty of a Doppler shifted pilot signal in a satellite or other communications system with relative signal source and receiver motion. The satellite communications system includes a user terminal (for example, a mobile wireless telephone), a gateway (terrestrial base station), and at least one satellite with unknown position and unknown relative velocity. The method includes the steps of shifting the pilot signal over a plurality of frequency hypotheses, coherently accumulating samples of the pilot signal over a plurality of chips, measuring the energy of the accumulated pilot signal samples, accumulating the energy measurements over a plurality of chips to produce an energy accumulation value, and determining which of the plurality of frequency hypotheses results in the highest energy accumulation value.